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Opportunities for a Deep Atmospheric Probe and Polar Orbiter at Jupiter

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The recent National Academy of Sciences Decadal Survey for Solar System Exploration recommended a Jupiter polar orbiter with deep probes as one of the new missions to consider for NASA's New Frontiers program. The report identified five key questions related to solar system formation and evolution that require a Jupiter polar orbiter; (1) determine whether Jupiter has a core, (2) measure the global oxygen and nitrogen abundance in Jupiter, (3) map the high order Jovian magnetic field, (4) explore the Jovian polar magnetosphere, and (5) investigate Jupiter's deep winds and internal convection.

In this paper, we present opportunities for a deep atmospheric probe as part an ongoing study for a Jupiter polar orbiter mission. Using a combination of gravity and magnetic field observations, microwave radiometry, in-situ fields and particles, and remote sensing, the polar orbiter can help to answer the above referenced key scientific questions. The combination of a probe and orbiter allows for a more detailed investigation of Jupiter's atmosphere as well as valuable direct in-situ measurements of Jupiter's atmospheric composition and winds.

Constrained by a $650M NASA cost cap, the opportunity to include a probe hinges on European participation. An overview of mission design, potential science payload, and measurement requirements will be presented.

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